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## Module 3

# CT for Preschool Future Teachers: Specific Features, Approaches and Practical Solutions

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### General Overview and Aim

The aim of this module is to allow preschool prospective teachers' in the initial teacher education:

- 1) to donate with the knowledge and skills necessary to teach CT;
- 2) to gain an insight about the pedagogical approaches, tools and assessment strategies while teaching CT;
- 3) to learn how to prepare instructional plans, materials and activities while integrating CT into educational process.

Hence, preschool prospective teachers will not only be trained by a “conceptual” and “pedagogical” view but also given the chance for “reflection” of their own understanding. Based on these facts, this module will consist of learning activities for preschool aged children that will teach preschool prospective teachers logical reasoning and problem solving with computational thinking considering skills like algorithmic design, pattern recognition, sorting, and searching. The activities will include unplugged activities like worksheets and educational games as well as creative drama. The activities will be organized in thematic headings and include various learning environments and tools which are collaborated with different disciplines.

### Background

Previous research has shown that preschool children can build and program simple robotics projects (Wyeth, 2008) in addition to learn ideas from engineering and computer programming while structuring their computational thinking skills (Bers, 2008). Computational thinking allows children to develop fine-motor skills and hand-eye coordination besides engaging in collaboration with other children and learn to work in teams. Additionally, it provides preschool teachers integrate academic content with the creation of meaningful products in a fun and playful technique (Resnick, 2003).

Hence, in this module, integration of CT into early childhood education will be the focus. First, all pedagogical approaches will be considered from theoretical point of view. This part will be followed by various activities. This module is composed of four units where each unit is oriented to approximately 6-13 hours of contact time, including assessment:

- 1) CS Unplugged Activities
- 2) Creative Drama Activities
- 3) Games and Toys
- 4) Integrating CT and STEAM into Early Childhood Education



### Target Group and Prerequisites

This module is primarily addressed pre-service teachers studying at Early Childhood Education programs. However, the module is also suitable for in-service preschool teachers' professional

development in computational thinking education. The module is prepared in blended learning approach (face to face + online) so the instructional design is flexible to be adopted in different study programs. The prospective preschool teachers need to know the basic concepts in the development of preschool children.

In this document, the instructor refers the faculty member that will be implementing these activities in the university course with prospective teachers. Students refer to the preschool students who are probably below age 6.

Digital instructional materials (like presentations, interactive exercises, H5P exercises) can be accessed from the learning management system (<https://tech.ankara.edu.tr>).

### Keywords

Preschool, early childhood education, CT, STEAM

Related competence frameworks

Mapp to DigCompEdu and teacher's professional competence standard.



### Learning Outcomes (LOs) and Assessment Methods

A successful learner will:

- Gain the knowledge about how to integrate CT concepts into early childhood education,
- Become aware of pedagogical approaches while integrating CT into curriculum,
- Criticizes instructional activities and different implementations from the point of inclusion of CT concepts, and
- **Be able to** design and develop instructional activities that supports teaching of CT and STEAM concepts within themes of preschool curriculum.

### Contribution to the Learning Outcomes

Learning Outcomes	Assessment Methods
1. Learning about Computational Thinking in Early Childhood Education	Worksheets are used for the evaluation of knowledge
2. Understanding the pedagogical approaches related with CT	Rubrics are used for the evaluation of discussions
3. Analyzing different activities including CT done by other prospective teachers	The discussions are evaluated by suitable rubrics
4. Developing activities which include CT and STEAM concepts for preschool children	Appropriate rubrics are used for assessment tools



## Module Plan and Didactical Approaches

This module involves four units, all structured into several activities. First unit focuses on the “A” in STEAM approach and provides conceptual understanding about the phenomenon. The second unit emphasizes on Creative Drama in Early Childhood Education. The other two units provides specific examples about “Games and Toys” and “CT and STEAM for Early Childhood”. Both units includes two specific implementations that focuses on delivery of CT skills.

### Unit 1: CS Unplugged Activities

- Introduction into the topic (Presentation): 15 min
- Activity: 60 min
- Theoretical background (Video): 30 min
- Activity: 30 min
- Activity: 30 min
- Brainstorming: 45 min
- Video: 30 min
- Reflection: 30 min
- Assessment: 60 min

Total: 5.5 hours

*Homework:* 2 hours

### Unit 2: CT with Creative Drama Activities

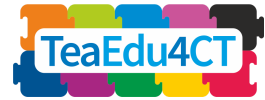
- Introduction into the topic (Presentation): 30 min
- Worksheet: 15 min
- Activity: 45 min
- Activity: 45 min
- Activity: 45 min
- Presentation: 15 min
- Video: 15 min
- Activity: 60 min
- Reflection: 60 min
- Activity: 30 min

Total: 6 hours

*Homework:* 1 hour

### Unit 3: CT with Games and Toys

- Activity: 30 min
- Activity: 30 min
- Activity: 30 min



- Activity: 30 min
- Research: 60 min
- Reflection: 60 min

Total: 4 hours

*Homework: 1 hour*

#### **Unit 4: Integrating CT and STEAM into Early Childhood Education**

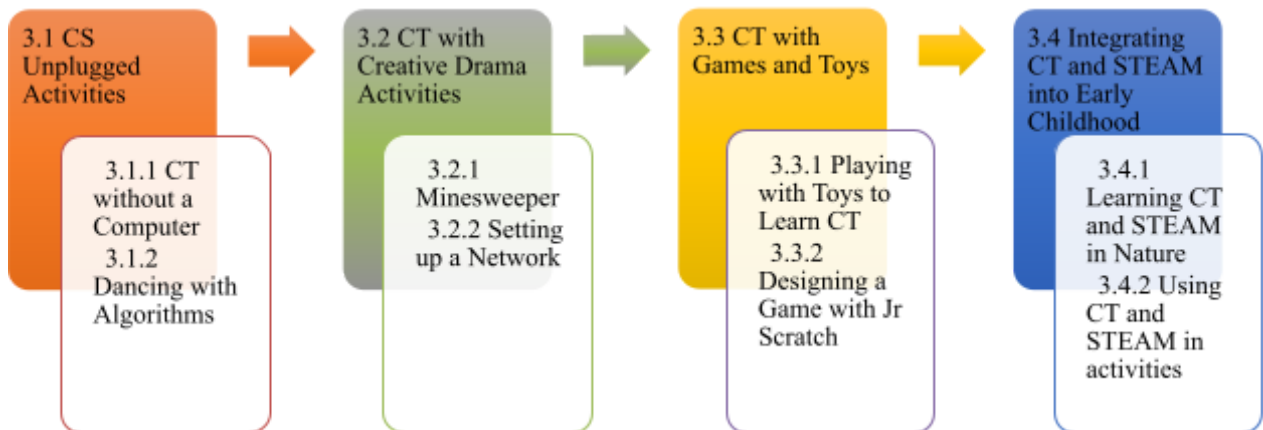
- Presentation: 15 min
- Access to computers for research: 30 min
- Video: 15 min
- Activity: 60 min
- Reading: 15 min
- Activity: 60 min
- Activity: 60 min
- Songs and Rhymes: 30 min
- Activity: 30 min
- Pretend-Reading: 30 min
- Warm-Up Activity: 30 min
- Activity: 30 min
- Activity: 15 min
- Activity: 15 min
- Video: 15 min
- Video: 15 min
- Digital Story: 30 min
- Activity: 45 min
- Activity: 45 min
- Video: 15 min
- Digital Activity: 30 min
- Worksheet: 30
- Activity: 30 min

Total: 11.5 hours

*Homework: 2 Hours*

**All 4 units will take a total of 27 hours. Additionally, the homework will totally take 6 hours.**

Flowchart about the flow of the module also visualizes the upcoming module (Figure 1).



### Units and Activities

## Unit 3.1 CS Unplugged Activities

### Activity 3.1.1 CT without a Computer

**Aim of the Activity:** In this activity, the prospective teachers are introduced with the term CS Unplugged in detail. After getting theoretical base, and explore related examples (videos and sample worksheets), the prospective teachers are required to design a CS Unplugged activity. All the aspects of CT will be learned and discussed in this activity.

#### Keywords

CS unplugged, preschool, CT, abstraction, decomposition, pattern recognition, algorithm design

#### Contribution to the Learning Outcomes

Learning Outcomes	Assessment Methods
Explore CS Unplugged concept through various activities for preschool students	Collaboration Groupwork
Integration of CT into early childhood education curriculum	Designing sample activities for preschoolers
Experience algorithm design through activities	Peer assessment
Compare block based programming vs physical programming	Preparation of poster



### **Presentation: What does CS Unplugged mean?**

The prospective teachers are asked what kind of activities are they planning to implement once they become a teacher? The answers can be grouped in any way that points out games, playing toys, creative drama and etc. Then through a presentation, the prospective teachers are introduced with the concept of CS unplugged. All the aspects of CT are addressed for teaching via Unplugged Approaches.



### **Hands-on Activity: Unplugged Activities**

The prospective teachers are asked to explore the CS Unplugged website and unplugged activities existing in the sample websites. They become aware of the activities by trying some sample activities themselves. All the aspects of CT are discussed through various activities. The other websites that will be used in this activity are as follows:

Computer Science without a computer

<https://csunplugged.org/en/>

CS Fundamentals Unplugged Lessons | Code.org

<https://code.org/curriculum/unplugged>



### **Watch a video: How to Integrate CT into Early Childhood Education**

After watching a video and discussing on the relevant issues, prospective teachers gain a sense about integrating CT into the preschool curriculum through the use of unplugged activities. The website of the video is below:

Computational Thinking (HelloRuby)

<https://youtu.be/K3vwRQCfTHc>

This video familiarize with the key concepts and practices of computational thinking and how CT can be offered across curriculum and offer cross-curricular examples. Covering decomposition, abstraction, pattern recognition and algorithms and how the concepts of computational thinking can be related back to everyday with real-life activities. The prospective teachers will learn more about tinkering, creating, persevering, debugging and collaborating. They will first watch the video and then discuss about the process and aspects of CT. Afterwards, the instructor gets suggestions from the prospective teachers to improve the experience and ask for new ideas.



### **Hands-on Activity: Unplugged - Tangram Algorithms**



The prospective teachers are requested to watch a video and try to write down an algorithm for any tangram piece that is preferred. After that, they will change algorithms with other prospective teachers and try to build a new algorithm. They will discuss what was experienced, and solve problems if they faced any. The video is as follows:

[https://www.youtube.com/watch?v=gW\\_aPXjgBTc](https://www.youtube.com/watch?v=gW_aPXjgBTc)

Once prospective teachers are in class with the preschool students, they need to differentiate the tangrams and the algorithms in order to make students explore that there may be different solution for the same problem. In other words, they can provide different logical steps to form the same algorithms.

Extra online activity: <https://mathigon.org/tangram>



### Hands-on Activity: My Robotic Friends

The prospective teachers are requested to watch a video and try to right down an algorithm for any cup design that they picked. For this activity, the prospective teachers will be paired and write the algorithms in the form of arrow signs. Then, change the algorithms and try to build the cups as requested by the algorithms as if they are robots. After the activity, they will be expected to discuss what they experienced, and solve problems if they faced any. This activity focuses on algorithm design. The video they will be watching is as follows:

<https://www.youtube.com/watch?v=xaW3PAzHxCU>

When the prospective teachers are in class with the preschool students, they will ask the students to draw the algorithms instead of writing them since the preschool students do not know how to read and write.



### Brainstorming: Block-Based Programming vs Physical Programming

The prospective teachers are expected to explore different ways to teach coding to students by exploring a website in pairs. They will discuss pros and cons of each software, pedagogical approach listed in the website and prepare a list for advantages and disadvantages of each attempt in pairs and share them with the whole class. The website is below:

<https://teachoutsidethebox.com/2016/12/coding-little-kids>

Based on the work completed in pairs, prospective teachers are expected to prepare a poster for differentiating between Block-Based Programming vs Physical Programming.

### Activity 3.1.2 Dancing with Algorithms

**Aim of the Activity:** In this activity, prospective teachers are introduced the pattern structure that can occur in an algorithm. In this respect, first prospective teachers watch videos and then perform the activity besides getting tips for implementing with their preschool students.

### Keywords

Pattern recognition, algorithm design

### Contribution to the Learning Outcomes

Learning Outcomes	Assessment Methods
Design a dancing algorithm	Peer assessment
Integrating algorithm design concept into preschool curriculum	Performance Assessment



### Watch a Video: Realizing Patterns in a Sequence

The prospective teachers will watch a video in order to explore specified patterns while dancing.

Learners first watch one of the videos in the following links:

1. <https://www.youtube.com/watch?v=C3c8fzbsfOE>
2. <https://www.youtube.com/watch?v=71hqRT9U0wg>
3. <https://www.youtube.com/watch?v=WX8HmogNyCY>

After watching the video, the instructor asked the prospective teachers to list and order the movements of the dance. For instance, for the 1<sup>st</sup> video, the following list can be developed:

- 1) Clap hands, 2) Pat knees, 3) Stomp feet, 4) Blink eyes and 5) Wiggle ears.






The instructor introduces that there exists a specified pattern in each dance. The dance has a sequence of movements and they are associated with the patterns in an algorithm. Then, the whole group watch the video again to focus on the patterns in the dance sequence and discuss them.



### Reflection: Designing a Dancing Algorithm

Learning groups involving three prospective teachers are formed. The groups are required to design a dancing algorithm including movements in a specific order. At the same time, groups can choose a background sound for the dance.

The class of preschoolers need to choose and prepare symbols that represents the patterns in a dance while the prospective teachers are teaching in the preschools. For example:

- |               |   |                |   |
|---------------|---|----------------|---|
| 1) Clap hands |  | 4) Blink eyes  |  |
| 2) Pat knees  |  | 5) Wiggle ears |  |
| 3) Stomp feet |  |                | are drawn on  |
|               |   |                | papers and use these symbols.   |



#### Assessment: Dance Performance

Each group of prospective teachers performs their dance of chosen movements in the class. The instructor and other groups of prospective teachers watch and assess the dance in order to examine and take notes whether there is a pattern of movements. After each group performs, the prospective teachers discuss the patterns in the dances.



#### Reflection (Homework): Thoughts on an Article

Prospective teachers will be asked to read a paper related with computer programming in preschools and write a reflection paragraph related with the paper. Below is the reference of paper, and the link of it which can be found online:

Otterborn, A., Schönborn, K. J. & Hultén, M. (2020). Investigating Preschool Educators' Implementation of Computer Programming in Their Teaching Practice. *Early Childhood Education Journal*, 48, 253-262.

<https://link.springer.com/content/pdf/10.1007/s10643-019-00976-y.pdf>



#### Watch and Learn Activity (Homework): Storigami



First, prospective teachers will be watching a video from YouTube about Storigami, learn how it is done and find the patterns in the activity watched. Then, they will develop their own storigami activity and shoot a short video of themselves while they are performing their storigami and send it to the instructor online. The video is below:

<https://www.youtube.com/watch?v=Wz7BUARb9rw>

While implementing this activity with the preschool students in the classes, the prospective teachers will need to, first, show how to do the storigami themselves and then expect their students to do it individually. They will support their students if needed.

## Unit 3.2 CT with Creative Drama Activities

### Activity 3.2.1 Minesweeper

Aim of the Activity: In this activity, the purpose is to design the necessary algorithm for the solution of a problem. Prospective teachers test the solution of the designed algorithm with their peers.

#### Keywords

Algorithm design, minesweeper

#### Contribution to the learning outcomes

Learning Outcomes	Assessment Methods
Have knowledge about the algorithm concept.	Algorithm design is assessed through Rubrics
Designing a minesweeper algorithm.	Algorithms are evaluated according to their correct working in the minefield



#### Presentation: What does Algorithm Mean?

Through a presentation the prospective teachers are introduced with the algorithm concept.







#### Digital Worksheet: Path Algorithm

With this activity, learners will understand the underlying idea of algorithms. Prospective teachers will work in the following sheet for drawing the routes among objects.

## Worksheet: Path Algorithm



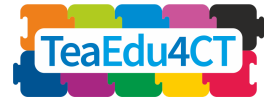
a					i
k					f
d					j
e					m
c					h
b					g

The prospective teachers will draw the routes between the related objects by using arrows. The first one is given as an example. In this example, prospective teachers are required to draw the route between the object a and i. The prospective teachers need to consider that they initially state in square a, then by going one square right, then two squares below, and finally one square left, they can reach the square i. The remaining routes (i.e. k to f, d to j, e to m, c to h, b to g) should be drawn in similar ways.



## Game Activity: Designing a Mop Algorithm

A route is drawn on the ground. If it is played in the preschool's garden, it can be drawn by colored chalks. If it is played in class, it can be drawn using colored paper tape. Below is a representative route. Route design may vary depending on the purpose. For the route, toys can



be placed in the specific squares. The prospective teachers will collect the toy when they come to the correct square.

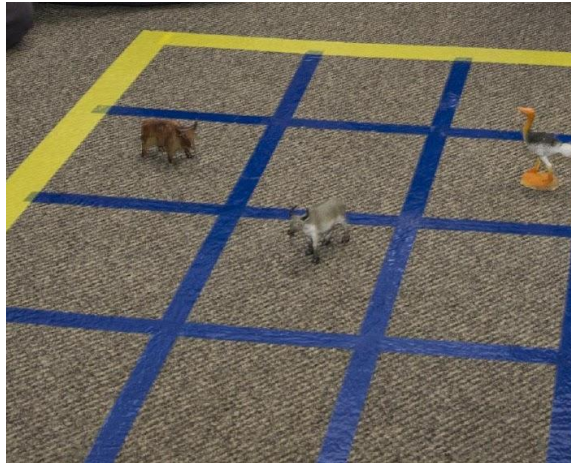
The prospective teacher uses two different colors; one color is for the route and the other color is for the rest of the floor. The route has a start point and end point. The class needs to be divided into two groups. Each of prospective teachers in the first group of will be taken one-by-one to the starting point blindfolded. The purpose of the second group of prospective teachers is to provide instructions to the blindfolded prospective teachers to reach the end point. When going to this point, instructions such as “turn right”, “one step forward”, “turn left”, “two steps ahead”, “one step backwards” and etc. are available.

In the next stage, the shape of the route is changed. For this, the toys will be replaced. Together with the prospective students, the steps to be followed are determined and a note is taken. Now, it is the turn for the second group of prospective students one-by-one to follow the route blindfolded with the help of the given instructions of the first group of prospective students.

While playing in the preschool classes, the prospective teachers will be using, first, the non-standardized measuring units like arm length and heel-toe. They can measure the squares with their arm length. They can give the instructions such as “one step forward arm length”. They can double foot jump and jump one foot in each route. Here, the purpose is to diversify the algorithm designs.

<b>Start</b>				
				<b>End</b>

Here is an example of an in-class activity:



<https://blogs.microsoft.com/on-the-issues/2016/11/17/teaching-kids-computer-science-no-computer-required/>



### Game Activity: Designing a Minesweeper Algorithm

Before the game, a “mine field” playground is prepared on the classroom floor or on the school garden. If the floor consists of tiles, a scenario can be prepared directly on the floor. It can also be prepared on the ground with the help of colored paper tape. Mines are created by putting crumpled recycled papers/stones/pine cone on certain parts of the playground. In this activity, the purpose is not the step on the square where there is a mine. While one pre-service teacher is blindfolded, he/she will get instructions where to step from another prospective teacher.

Here is how the game is played: The prospective teachers are divided into groups with a maximum of 5 people in each group and the groups are told to find a name for their group. The instructor introduces the game and directions as follows: “We will play a game with you. The name of this game is Minesweeper and our goal in the game is to write the algorithm that will successfully pass the minesweeper step by step. In this process, you should act with your group mates. You should carefully examine every detail and write the algorithm. In the preschool classes, since the preschool students may not be able to write, they need to draw arrows instead of writing.”

The starting point in the minefield is shown to the prospective teachers and the groups are given enough time to write the algorithm. At the end of this period, one group lined up to the left and one group lined up to the right of the minefield. The algorithm of the first group is given to the second group. Two prospective teachers are selected from the first group. One is taken to the starting point of the minefield and blindfolded and the other is sent to the second group to check the instructions. The prospective teachers in the second group are asked to read the algorithm which are in their hands step-by-step to their friends in the first group and meanwhile they are told to follow these steps. Each student should read one step, like “turn right”, “take a step forward”, “take a right foot one step forward” etc. The checking student will check whether the algorithm read is performed correctly.



During the reading of the algorithm, if the blindfolded student reaches the other side without stepping on the mines, the group that writes the algorithm will win the game. If one hits one of the mines, the group will lose and the turn will pass to the other group. The game ends after all the groups have experienced the game. At the end of the game, students' opinions on algorithm, writing and controlling algorithm are taken.

Once the prospective teachers are in the class of preschoolers, the number of frames in the game is determined according to the preschool students' level. At least 4 columns x 4 rows can be prepared. The number of mines can also be reduced or increased depending on the students' level. With preschool students, instructions like "jump with both feet" can also be given to the blindfolded preschool student. Sample field with crumpled recycled papers representing mines is below:

		<b>Start</b>	
			
			
		<b>End</b>	



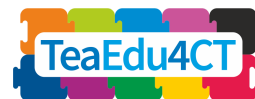
### Drama Activity: Let's Make a Puppet

Materials: "String puppet" song, materials for puppet making (socks, string, scissors, colored buttons, colored pencils, glue, cardboard paper)

#### Process

##### A. Warming-Preparation

Step 1. A circle is created with the prospective teachers. A song is turned on and the movements of the song are done with the prospective teachers by the leading instructor. Everybody sings the song together. After singing, the prospective teachers are asked which parts of the body was mentioned in the song, respectively.



In the classrooms of preschool children, the attention is drawn to the order of the parts of the body in the song by showing the parts.

Here are some sample songs to be used:

<https://youtu.be/CG8F-6dZk8k>

<https://www.youtube.com/watch?v=BwHMMZQGFoM>

Step 2. Prospective teachers become pairs. One of the two becomes puppet and the other becomes puppet player. Puppet players say, “Walk forward, turn right, walk back, turn left, return” etc. and they circulate the puppets in the place with instructions. Prospective teachers are reminded that puppets should not hit a place or be damaged.

Then, the pairs change roles and the same action is repeated. In the second part of the game, the prospective teachers go behind their pairs and by touching, they give the instructions to the movements, like touching their right shoulder (turn right), touching their left shoulder (turn left), touching their head (go forward) and touching their back (go backwards) commands will be used. After that, pairs change role.

#### B. Role Playing

Step 3. The instructor enters the play and says, “Now, all the puppets will come to the stage in turn and freeze with a form they want.” For this step, a suitable corner is designed like a stage.

As the prospective teachers go on stage, one of the songs turns on again. A Prospective teacher come on stage like a puppet and freeze with a form as he/she wishes. The other prospective teacher touches his/her peers’ shoulder and asks him/her to tell what kind of puppet he/she is and how he/she feels. Then, each pair of prospective teachers take tunes and are asked to go on the stage. After puppet talk, they dance together with the song.

#### C. Evaluation-Discussion

Step 4. Puppets are made with the materials provided (socks, stick, spoon, etc.) by the prospective teachers. After the puppets are completed, the prospective teachers express what they feel and dance again with the song as they wish.

### Activity 3.2.2 Setting Up a Network

**Aim of the Activity:** In this activity, prospective teachers are expected to learn the structure of a network and transmission of an information throughout the network. Prospective teachers view presentations, watch videos, and then perform activities. The prospective teachers will also learn the data transmission through CT.

#### Keywords

Network, information transmission

### Contribution to the Learning Outcomes

Learning Outcomes	Assessment Methods
Gain knowledge about computer networking and information transmission concepts	Rubrics are used for evaluation
Perform activities about computer networking and information transmission concepts	Prospective teachers will be assessed whether they learn about the addressing issue, transmission of information according to their responses in the drama activity and their individual design of a path



#### Presentation: What does Computer Networking Mean?

Through a presentation, the prospective teachers are introduced with the concept of computer networking.



#### Activity: Learning Information Transmission

Prospective teachers were provided with a map of a train network of London city. In this network, there are several ways to go to a station from another one.

Each prospective teacher is provided with one starting and one destination station. Then, prospective teachers individually were expected to draw a route between starting and destination points. After that, prospective teachers having the same starting and destination points were grouped and expected to share and discuss their solutions. During this discussion, it will be understood that there can be several routes and various number of stops between two stations. In addition, some routes can be shorter or some routes can take less than others.

Prospective teachers were introduced that computer networks perform similarly as transportation networks. As people move by train networks, data move by computer networks. In the train network, there are starting stations and destination stations for travelling people. Similarly, data have starting and destination addresses in computer networks. As there are different routes between stations, there are different ways for the travel of data between one computer and another.

#### Reference:

<https://www.digitaltechnologieshub.edu.au/teachers/lesson-ideas/computer-chatter-1v>



### Watch a Video: What Does Data Transmission Mean?

Through a video, the prospective teachers are introduced with the concept of data transmission in the computer network.

The data transmission video can be accessed from the link:

<https://www.youtube.com/watch?v=cBZUckBCy-U>.








### Game Activity: A Lost Package

Prospective teachers are expected to make a circle by holding hands. Each prospective teacher is provided a different address. This address can be written in a paper and put near feet of each prospective teacher. The instructor can be in the center of the circle and introduces the concepts of networking and information transmission by associating it to the circle of prospective teachers.

The instructor introduces the story of an information package lost in the network and trying to find its way. Prospective teachers make a different shape again continue to hold their hands. Each prospective teacher is thought himself/herself like a computer in the network. Instructor can use a closed box that the sending and the destination addresses are written on it. In the closed box, there is a secret message written. Teacher asks which prospective teacher will be sender and which prospective teacher will be the receiver. The box will be transmitted between prospective teachers like the transmission of an information in the network. The receiver will at the end get the box, open it and read the message. Every time the box is opened, the instructor changes the message. This activity will continue by revision of the prospective teachers stands, sender and receiver addresses, and the different messages.

Since the preschoolers do not know how to read and write, prospective teachers will use






symbols like post office , beach , train station  and etc. for the addresses and

the message like “after this, we will go out  and drive the bikes” .



### Reflection: Designing a Path for the Information Transmission

Each prospective teacher in the class writes a specific number indicating their address. Prospective teachers are required to send messages to one of their friends. Hence, each prospective teacher writes a message and puts it into an envelope together with sender and receiver addresses on it. Then, prospective teachers are expected to draw a path for the transmission of their messages. After the drawings are completed, each learner performs the envelope transmission based on the path, hence each receiver gets the package, opens it and reads the message.

In the classrooms, since the preschoolers do not know how to read and write, prospective teachers will ask them to draw the addresses (like post office , beach , train station  and etc.) and messages (like “after this, we will go out  and drive the bikes” ) instead of writing them.



### Hands-On Activity: Designing a Drama Activity about Networking

Prospective teacher groups involving 3 are created. The groups are required to design a drama activity about the networking concept.



### Activity (Homework): Algorithm Activity

The prospective students are asked to prepare an activity which can be played with a group of preschool children that contains algorithm. The prospective students need to make sure that the children learn the concept of algorithm and its use.

### Unit 3.3 CT with Toys and Games

#### Activity 3.3.1 Playing with Toys to Learn CT

**Aim of the Activity:** In this activity, prospective teachers will learn about pattern recognition, algorithm, abstraction, and decomposition concepts by the use of different toys.

**Keywords**

Pattern recognition, algorithm, abstraction, decomposition

#### Contribution to the Learning Outcomes

Learning Outcomes	Assessment Methods
Gain knowledge about pattern recognition, algorithm, abstraction, and decomposition	Appropriate rubrics are used for assessment
Perform activities based on pattern recognition, algorithm, abstraction, and decomposition	Learners' performances in the activities will be assessed



#### Game Activity: Understanding Pattern Recognition

Prospective teachers are provided with a toy and different cards. The cards allow participants to understand the pattern in these cards. Then, they develop the same pattern in the toy. Sample toy and cards are provided as follows:

<https://yellow-trendz.com/products/kids-game-training-toy>



The similar field and directions can also be developed by the use of paper and crayons by the prospective teachers.



### Game Activity: Understanding Algorithms

Prospective teachers are provided with a toy containing a path in a sample field. They follow the directions and reach the destination. Sample toys can be as follows:

<https://www.primotoys.com/>



The similar field and directions can be developed by the use of paper and crayons.



### Game Activity: Understanding Abstraction

In order to understand the abstraction concept, prospective teachers play the following game:

Prospective teachers make a circle. One prospective teacher stays in middle and make a random sound and movements. He/she repeats the sound and movements until charging someone in the circle to do the same sound and movements. If the person charged do the sound and movements in the same way, then he/she moves to the center. The new participant starts to make a random sound and movements. Game continues until everyone in the circle has a turn.



### Game Activity: Understanding Decomposition

In order to understand the decomposition concept, prospective teachers play the following game:

The instructor brings a box involving 20 random items like a spoon, a comb, a pencil, a stone, a paper etc. Instructor puts the box in the center and prospective teachers look inside the box for about one minute. Then, the instructor takes the box away and have the prospective teachers draws the objects that they can remember on a sheet of paper using crayons. After everybody finishes drawing, the group discuss the items and at the end, they all look inside the box whether they get all of the items correct.

In the preschool classes, according to the children's developmental level, the prospective teachers can ask the children to draw the items in their exact colors, shapes, length and etc.

### Activity 3.3.2 Designing a Game with Jr Scratch

Aim of the Activity: In this activity, prospective teachers will learn about coding and develop a sample game by programming.

#### Keywords

Block-based programming, physical programming, coding

#### Contribution to the Learning Outcomes

Learning Outcomes	Assessment Methods
Gain knowledge about block-based programming, physical programming.	The discussion about their pros and cons.
Design game by coding	Game is assessed according to its algorithm and functions



#### Research: Coding Games for Kindergarten

Prospective teachers explore different coding games and tools that can be used in the classroom with preschool students. They need to make sure that they know all the features of the coding games and tools before introducing them to the preschool students. Here are some examples of coding games and tools:

<https://www.tynker.com/>

<https://childhood101.com/coding-for-kids/>

<https://teachyourkidscode.com/coding-for-preschoolers/>



#### Reflection: Design Your Own Game

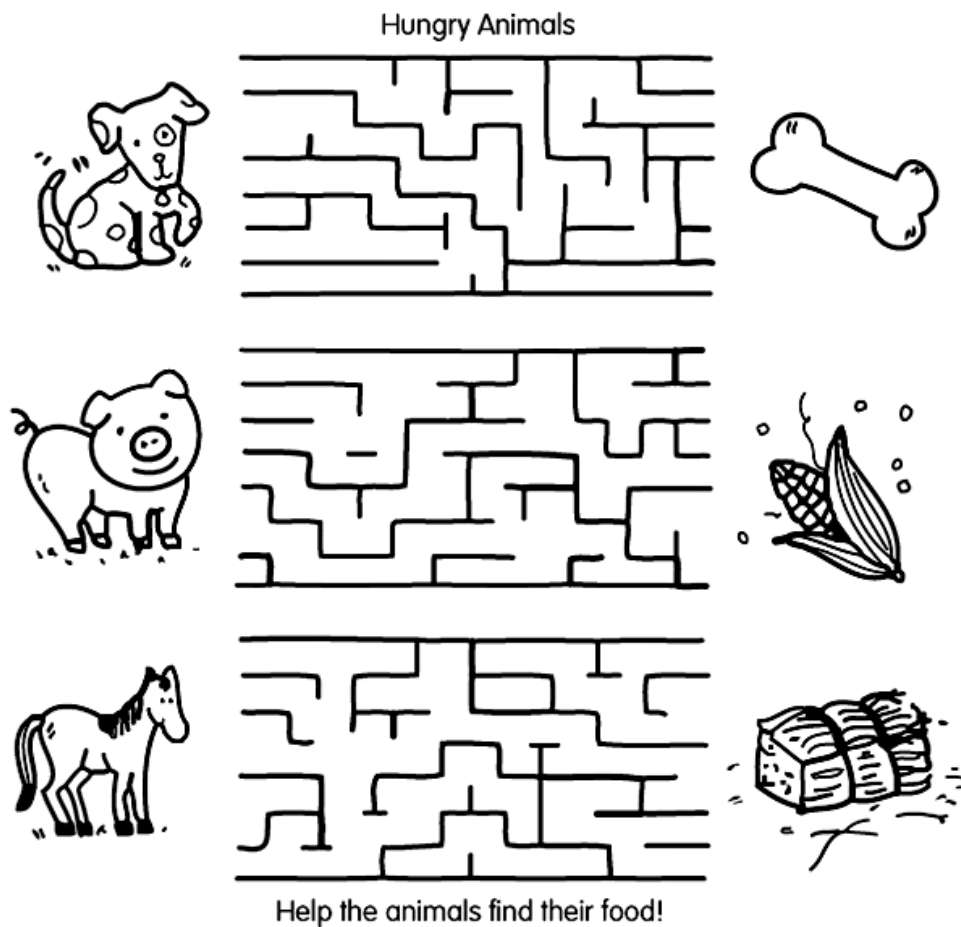
Using Jr Scratch or any other tool, prospective teachers will be asked to write an algorithm for a sample program and then create it through the game. Each of them will ask a peer try it and take their feedback for improving their game. They need to ask whether this game is suitable for preschools' use and learn coding.



**Homework: Worksheet of an Animal Maze**

Prospective teachers will prepare an animal mazes for their preschool students to find the correct way and color the page. They need to consider their preschool students' developmental level to make it harder or easier. A sample of a worksheet is as follows:

<https://tr.pinterest.com/pin/387098530467075022/>



This activity can be complicated by thinking the labyrinth in the form of a matrix where students will form the directions as arrows while presenting the solution.

### Unit 3.4 Integrating CT and STEAM into Early Childhood Education

#### Activity 3.4.1. Learning CT and STEAM in Nature

Aim of the Activity: In this activity, prospective preschool teachers will learn how to use CT and STEAM in nature and study to teach to their preschool students with the help of these concepts.

#### Keywords

CT, STEAM, early childhood education, nature

#### Contribution to the Learning Outcomes

Learning Outcomes	Assessment Methods
Learn how to integrate CT and STEAM in nature	Rubrics are used for evaluation of the concepts
Understand how CT and STEAM notions can felt by preschool children	For assessment, appropriate rubrics are used



#### Presentation: Introduction to “Natural Environment”

Instructor presents the topic via a PowerPoint to the prospective teachers and their opening about how they can teach their preschool students to feel a part of the nature.



#### Research: Access to Computers for Internet

In pairs, prospective teachers will search useful websites related with natural environment which are suitable for young children. Pairs will discuss how to use these websites with students. Furthermore, they will discuss CT aspects of the activities they will design and implement in classroom.

**Video: “Natural Environment”**

First, the group of prospective teachers will watch a video related with natural environment for students and discuss how to use the information in the video in preschool settings.

<https://www.youtube.com/watch?v=oxhYaiSnIAo>

<https://youtu.be/cJQ5XzzzGj4>

**Activity: CT and STEAM in Nature**

In this activity, prospective preschool teachers will work in groups and alone to explore nature and learn to teach their preschool students how to be comfortable in nature and use CT and STEAM concepts while working in nature. In every step of the activity, the prospective teachers will be asked what CT aspect is used in the step. They will form a camp area, examine the natural elements found in nature, learn to find their way to their camp area, stay and do activities in the camp without harming the nature.

Preparations are made before the activity. The tents are set up (Engineering), fireplace is determined (Science) and the stations are prepared (Maths). Three stations (tent station, map station and nature station) are determined. Then breakfast is served outdoors. After breakfast, while collecting and cleaning, a cleanup song will be listened:

[https://www.youtube.com/watch?v=gPq7wzGEjqE&feature=emb\\_title](https://www.youtube.com/watch?v=gPq7wzGEjqE&feature=emb_title)

Before pre-service teachers apply the activity with their preschool students, they need to explore and check the area of the camp beforehand. Once the pre-service teachers are with their preschool students, they will do all the activities with the help of the children. Every step will be done with pre-service teachers and the children all together.

After breakfast, the prospective teachers go for a little trekking to explore the area by the leadership of the instructor. While walking, they are asked to put some non-living materials that they find interesting such as stones, leaves and tree bark into their bags. They are reminded that they can only pick up non-living things (Science). The materials they collect are examined after sitting on the ground for a little rest. At the end of the examinations, an assessment is made with the collected materials: The instructor, leading the group ask questions to the group related with the differences and similarities of materials collected (Maths).

After a little walk, prospective teacher are given the opportunity to watch the ducks in, above and around the lake/pond; birds up in the sky and down on the trees; ants in their homes and out on the ground. Near the pond/lake, the prospective teachers are asked to do bridges in groups of 2-3 with the collected natural items and the sand near the pond/lake. If they need more items, they can pick up around. They are requested to share their items with their peers.

The instructor reminds the only rule to prospective teachers, which is, when a small stone is put on the bridge they made, it will not break (All aspects of STEAM). Prospective teachers may also make little rives coming through the pond/lake that can pass under their bridges (All aspects of STEAM).

After assessing whether the bridges are not breakable and taking the photos of the bridges the prospective teachers started walking again. While walking in the woods, they take out a piece of paper each from their folders and make the traces of the tree stumps and fallen leaves with their crayons like in the example shown below (Arts):



Prospective teachers were asked whether they know the way to the camp area (Science). If not, they can be given some tips, like “Remember the big tree. We pass that tree and walk straight through the pond/lake.” After the walk, they reach the camp area and a big circle is formed. The prospective teachers are divided into three groups by their wishes. Each group is given animal names such as “fish”, “frogs” and “ducks”. Prospective teachers are taught scouting oath by listening the YouTube video below (Technology):

<https://www.youtube.com/watch?v=S-Dl3rkDeyE>

These three groups alternately take turns in all the three stations. These are “tent station”, “map station” and “nature station”.

Investigations are carried out with magnifiers in the nature station. Prospective teachers are asked to investigate the tree barks, leaves, surface of the soil and any insects they see. They are requested to touch the soil and are asked whether it is hot or cold, rough or flat, moist or dry, sticky or non-sticky. For the evaluation, specific insects and animals living in the forests of the community are explained with pictures using the book of “Bug Detective” for this activity (Science). If that specific bug/insect does not live in that area, it is mentioned by the instructor.



### Reading and Exploring the Content of a Book

Prospective teachers will be read and explored the book of “Bug Detective” and discuss the features of the bugs/insects. They explore the area for the specific bugs/insects which are mentioned as living in the area by the instructor (Science).

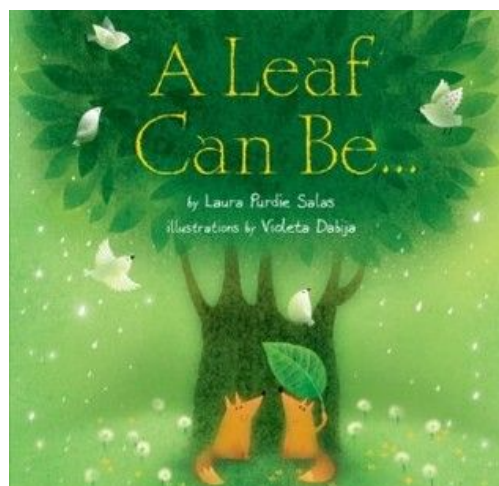
<https://www.amazon.com/Bug-Detective-Maggie-Li/dp/1454915161>



### Alternative Reading

If the weather is not suitable for exploring the bugs (for example; they are all under the snow if it is winter), the prospective students can use “A Leaf Can Be” book by Laura Purdie Salas and investigate about fallen leaves they collected earlier and identify the differences between the leaves (Science). Here is the book:

<https://www.amazon.com/Leaf-Can-Millbrook-Picture-Books/dp/0761362037>



### Activity: Finding Our Way in Nature

At the map station, prospective teachers talk about finding their way by taking advantage of nature. A drama activity is prepared and lead by the instructor. In the activity, the instructor tells a story of a child who has gone for a walk with his/her friends and teacher in the forest and got lost by himself/herself. The prospective teachers are asked what they can do to help this child. Then main directions are explained through the area. Compass help is used to explain directions. Afterwards, they talk about what they can do when they do not have a tool such as a phone (a communication tool) and/or a compass (a direction finder). The mossy side of the

trees is examined that it shows the north with the magnifying glass in their hands and a compass is used to test the mossy side whether it show the north. Discuss whether there are other different techniques to find the way in the woods (like looking at the ant homes and etc.) (Science and Technology).



### Activity: Having Fun in the Camp

At the tent station, prospective teachers are asked about tent life. Together, they examine the materials needed to set up tents. Installation of the tent is completed with the help of all the prospective teachers (Science, Technology, Engineering, Math). Afterwards, the campfire is lit by adding pieces of wood collected by prospective teachers from nature. The pieces of wood which are safe for both people and the nature to be picked up are explained (Science).



### Songs and Rhymes

After all 3 groups come to the camp area, setting up the camp fire, everyone will get a place near the fire and make a big circle around the fire place. Then, the instructor shows the North by the compass (Technology) and says that they will all turn by facing North and walk around the fire and say this rhyme:

<https://www.songsforteaching.com/tickletunetyphoon/goingonabearhunt.htm>

After saying the rhyme, the prospective teachers will sit around the campfire in a big circle and sing these songs:

<https://campsongs.wordpress.com/2012/05/03/baby-shark>

<https://www.songsforteaching.com/hughhanley/imanut.htm>

<https://campsongs.wordpress.com/2013/02/18/b-i-n-g-o>



### Activity: Making S'mores on Campfire

No camping trip would be complete without this classic campfire snack. Prospective teachers can also have fun by telling camp stories to the group while having their snacks (Science).

Although young children aren't always ready to stand close enough to the fire to actually roast the marshmallows, they can help with assembling the s'mores and will likely enjoy watching and participating in the whole process. While preparing they can count the ingredients, the s'mores they have eaten and etc. (Maths) The prospective teachers can scaffold them during the whole process. There is a useful website for this activity below:

<https://www.needpix.com/photo/828426/food-chocolate-smore-campfire-delicious-snack-roasted-crackers-marshmallow>



After having the delicious s'mores, the campsite will be collected and cleaned while the "clean-up song" is on. Here is the song:

[https://www.youtube.com/watch?v=gPq7wzGEjqE&feature=emb\\_title](https://www.youtube.com/watch?v=gPq7wzGEjqE&feature=emb_title)



### Pretend-Reading a Book in the Tent

The prospective teachers are allowed to read their books for a while inside the cozy environment of their tents.

As for the preschool children; after the campfire activity is completed, preschool children are allowed to spend time in the established tents by pretend-reading books as they wish.



### Reading 1 (Homework) Paper

“The Natural Environment as a Playground for Children: The Impact of Outdoor Play Activities in Pre-Primary School Children” by Fjørtoft will be read by the prospective teachers. After reading the paper, the prospective teachers will be asked to write a reflection paragraph about the paper. Here is the reference of the article and a link on the internet to access the article:

Fjørtoft, I. (2001). The natural environment as a playground for children. Early Childhood Education Journal, 29(2), 111-117.

<http://www.imaginationplayground.com/images/content/3/0/3002/The-Natural-Environment-As-A-Playground-For-Children-The-Impac.pdf>



### Reading 2 (Homework) Paper



“Place-based education from three perspectives” by Cincera, Valesova, Krepelkova, Simonova & Kroufek will be read by the prospective teachers. After reading the paper, the prospective teachers will be asked to write a reflection paragraph about the paper. Here is the reference of the article and a link on the internet to access the article:

Cincera, J., Valesova, B., Krepelkova, S., Simonova, P., & Kroufek, R. (2019). Place-based education from three perspectives. *Environmental Education Research*, 25(10), 1510-1523.

<https://www.tandfonline.com/doi/epub/10.1080/13504622.2019.1651826?needAccess=true>



### Reading 3 (Homework) Paper

“Are Illustrations and Texts in Picture Storybooks Innocent? - Natural Environment Messages Transmitted” by Cabuk, Bas & Teke will be read by the prospective teachers. After reading the paper, the prospective teachers will be asked to write a reflection paragraph about the paper. Here is the reference of the article and a link on the internet to access the article:

Çabuk, B., Baş, T. & Teke, N. (2017). Are Illustrations and Texts in Picture Storybooks Innocent? - Natural Environment Messages Transmitted. Mafalda Carmo (Ed.) *Education and New Developments*. p. 333-337. InScience Press, Lisbon, Portugal.

[http://insciencepress.org/wp-content/uploads/2017/11/Education-and-New-Developments\\_2017.pdf](http://insciencepress.org/wp-content/uploads/2017/11/Education-and-New-Developments_2017.pdf)

### Activity 3.4.2. Using CT and STEAM in Activities

**Aim of the Activity:** In this activity, the prospective teachers will learn how to implement CT and STEAM in the activities in their daily plans.

#### Keywords

CT, STEAM, activity, daily plan

#### Contribution to the Learning Outcomes

Learning Outcomes	Assessment Methods
Learning to use CT and STEAM in activities	For assessment, appropriate rubrics are used
Supporting the computational thinking of their students	Rubrics are used for evaluation of the concepts



### Warm-up Activity with Orff Schulwerk Technique

After the camp activity, the instructor will tell the prospective teachers that they will do some activities related with the camp they had.



First, together with the prospective teachers, a warm-up activity is done. Heads, arms and legs are turned, bouncing motion is made with pieces of Orff Schulwerk music. Here are some sample music of Orff Schulwerk:

[https://www.youtube.com/watch?v=dChJLDPodQ4&feature=emb\\_title](https://www.youtube.com/watch?v=dChJLDPodQ4&feature=emb_title)

[https://www.youtube.com/watch?v=YzRqV\\_H0ESk&feature=emb\\_title](https://www.youtube.com/watch?v=YzRqV_H0ESk&feature=emb_title)

The instructor can also teach the prospective teachers some breathing activities. A related example is as follows:

<https://youtu.be/zRRCfmCcKI0>

For the preschool children; this activity can either be done in the camp area or in the classroom after the children are returned to the preschool.



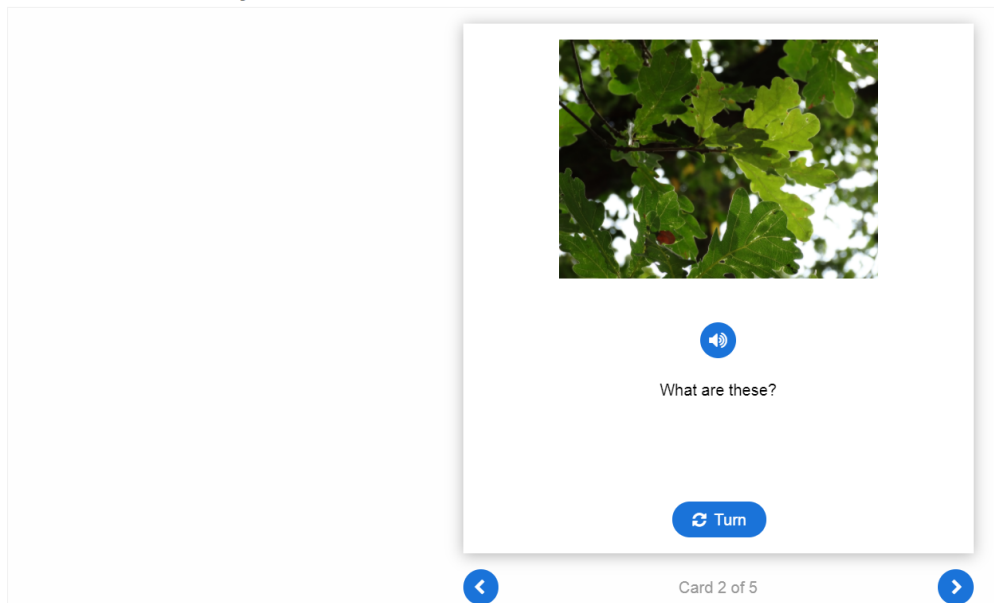
#### Activity: Arts and Crafts in Pairs

After the warm-up activity and breathing activities, the instructor will show the prospective teachers some examples of pictures of arts and crafts activities which can be done using the collected materials from the camp area and ask them to choose one of them or create their own product in pairs as they wish. Pairs need to observe the collected items and discuss the patterns that they will use, which materials need to be used first, second, third and so on in order (algorithms) before starting the activity (Arts).



**Activity: Flash Cards**

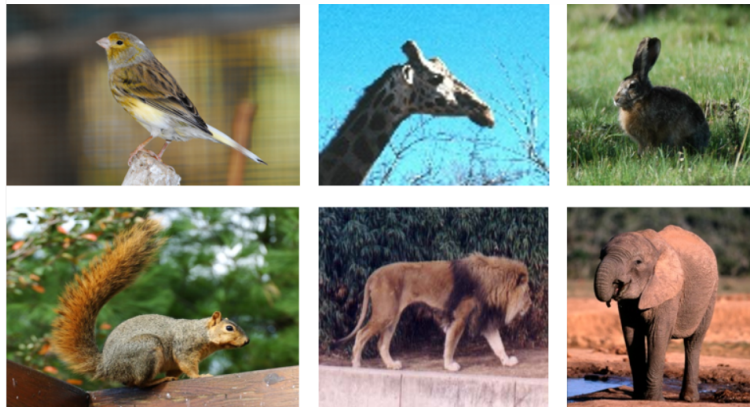
Through a digital flash-card activity, prospective teachers are expected to prepare flash-cards for the preschool children to identify the materials they collected in the forest (Maths, Technology) in a suitable computer program. An example flash card is below:

**Flash Card Activity: Collected Materials****Activity: Forest Animals**

Prospective teachers are asked the question ‘What are the animals living in the forests of our community?’ Place-based education is sensed to the prospective teachers. Since they read an article and reflect on the article about it, they would also be ready for making their preschool students to sense the place-based education. (For example; According to the answers received, it is informed that animals such as lions, elephants and giraffes do not live in the forests of Turkey, but animals such as brown bear, deer and wolves live in the forests of Turkey.) Every can needs to check the animals which live in their own community. The prospective teachers then will discuss what they can ask children according to place-based education (Science).

In the preschool classes, preschool children are provided an activity to identify the animals living in forests of their own community. An example for Turkish forests is given below:

Activity: Find the animals that you can see in the forest



**Video: Directions**

A video related with “Directions” is shown to the prospective teachers and then discussed the ways to teach directions to the preschool children (Science, Engineering, Maths). Here is the video:

[https://www.youtube.com/watch?v=Te0Td0QVoj0&feature=emb\\_title](https://www.youtube.com/watch?v=Te0Td0QVoj0&feature=emb_title)



**Video: How to Navigate Using Plants**

Another video related with how to navigate using plants is shown to the prospective teachers and then discussed the ways to navigate using plants to the preschool children (Science, Engineering). Here is the video:

[https://www.youtube.com/watch?v=FiLPIEp4\\_tk&feature=emb\\_title](https://www.youtube.com/watch?v=FiLPIEp4_tk&feature=emb_title)



**Digital Story: “Finding Way in the Forest”**

Then, a short digital story about Finding Way in the Forest is watched (Science, Technology, Maths) and discussed.



### Activity: Scrapbook of Our Camp Trip

The instructor tells the prospective teachers that they will do scrapbooks with the pictures taken at the camp (All aspects of STEAM). There is a description about how to do scrapbooks here in this link:

<https://innerchildfun.com/2013/08/simple-summer-scrapbooks-kids-can-make.html>

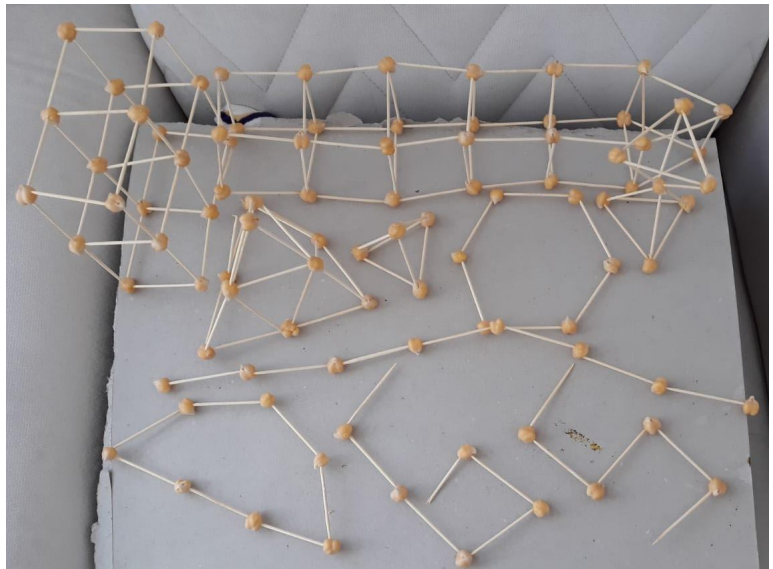


### Activity: Building Our Own Bridges

The prospective teachers are reminded about the bridges they made near the pond/lake during their camp trip. The instructor show the photos of the bridges the prospective teachers made. They talk about the strong ones and the weak ones and the ways they made the weak ones stronger. Then, they will talk about doing strong bridges in class or in the school garden using the materials in preschool classes.

For the children in the preschools, they were told that they will do bridges in small groups of 2-3 in the classroom or in the school garden with the materials in the classroom. They are free to use any item in the classroom they want and they are reminded that if they want to do their bridges in the garden or in the classroom, they will clean everything afterwards. The children are asked where they want to work and divide into two groups: ones which will work in the classroom and ones which will work in the garden. Before they start, the prospective teacher show them pictures of bridges and tell them they can do similar bridges or the ones as they wish and remind them that they need to be strong.





Self-taken photos: no copyright issues



<https://search.creativecommons.org/photos/90de7bf3-6e75-40b8-b0b5-92020a2fc81a>



**Video: Setting Up a Camp Tent**

Prospective teachers watch a video about setting up camp tent, and then participate in an activity for ordering steps of setting a tent (Science, Technology, Engineering, Maths).

[https://youtu.be/\\_rr6vzBhhOg](https://youtu.be/_rr6vzBhhOg)



### Digital Activity: Ordering the Steps of Setting Up a Tent

A digital activity related with ordering the steps of setting up a camp tent is done by the prospective teachers (Science, Technology, Engineering, Maths).







### Worksheet: "Camp Place"

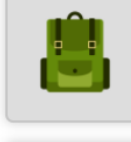
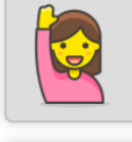
A digital worksheet needs to be prepared by each prospective teacher by finding the pictures online and thinking the gains of their worksheet for the preschools (Technology, Science). An example worksheet is given below:


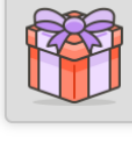
Drag and Drop Activity: Find Living and non-Living Things

Living Things	Non-Living Things

☒ Check



### Activity: Sketch of Camp Place

By using the photos taken at the camp area, the sketch of the camp place is prepared using geometrical shapes. 3 station groups prepare different side of the area where they explored in their stations. The prospective teachers will use milimetric papers and draw the scratch of the whole area by combing the 3 different areas. Discussions were made afterwards. (All aspects of STEAM is used.)

For the preschool children, the prospective teachers may need to scaffold the children since they may need help using the milimetric papers and combining the three different areas of the camp place.



### **Homework: Cut, Fold and Prepare Your Own Camp Place**

Prospective teachers will prepare a homework each for the preschool children related with camp. The children will cut, fold, glue and prepare a camp place and play with a parent.



### Implementation Ideas

If it is not available to go to a forest, prospective teachers can take the children to the school backyard or another natural place.

Changes can also be made for children with disabilities. For example; if there is a visually impaired child in class, it is provided to visit the stations under the guidance of the prospective teacher. The information at the stations is given in more detail to the child by his/her senses other than vision is activated. The prospective teacher also helps the child to perceive nature by touching.

Although the instructional activities and materials here are developed for prospective teachers and preschool students, they are prepared as examples. Hence, more difficult and varied versions of these materials can be prepared in a flexible way that addresses different needs of countries, various developmental and age levels.

Digital interactive exercises provided through H5P tool and other worksheets can also play a guide role and can be enhanced and revised according to the expectations of implementers.



### Assessment Requirements and Assessment Strategy of the 4 Units

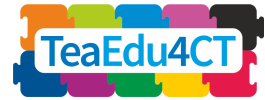
Assessment task	Assessment criteria and method
Learning about Computational Thinking in Early Childhood Education	Worksheets are used for the evaluation of knowledge
Understanding the pedagogical approaches related with CT	Rubrics are used for the evaluation of discussions
Analyzing different activities including CT done by other prospective teachers	The discussions are evaluated by suitable rubrics
Developing activities which include CT and STEAM concepts for preschool children	Appropriate rubrics are used for assessment tools



### Additional Resources

Here are some further readings for prospective teachers:





Zapata-Ros, M. (2019). Computational Thinking Unplugged. Education in the Knowledge Society, 20, 1-29.

<https://pdfs.semanticscholar.org/8ea2/7254a97161a9c75acbc26a1350cefdd5637c.pdf>

Sullivan, A. A., Bers, M. U., & Mihm, C. (2017). Imagining, playing, and coding with KIBO: using robotics to foster computational thinking in young children. Siu-cheung KONG The Education University of Hong Kong, Hong Kong, 110.

<https://www.eduhk.hk/cte2017/doc/CTE2017%20Proceedings.pdf#page=121>

Bower, M., Wood, L. N., Lai, J. W., Howe, C., Lister, R., Mason, R., & Veal, J. (2017). Improving the computational thinking pedagogical capabilities of school teachers. Australian Journal of Teacher Education, 42(3), 53-72.

<https://ro.ecu.edu.au/cgi/viewcontent.cgi?referer=https://scholar.google.com.tr/&httpsredir=1&article=3424&context=ajte>



#### References (As They are Appeared in the Module)

Wyeth, P. (2008) How Young Children Learn to Program With Sensor, Action, and Logic Blocks, Journal of the Learning Sciences, 17:4, 517-550.

Bers, M. U. (2008). Blocks, robots and computers: Learning about technology in early childhood. Teacher's College Press, NY, NY.

Resnick, M. (2003). Playful learning and creative societies. Education Update, 8(6). Retrieved from <http://web.media.mit.edu/wmres/papers/education-update.pdf>.

Module 3 on Ankara University's Moodle Website

<https://tech.ankara.edu.tr>

Computer Science without a computer

<https://csunplugged.org/en/>

CS Fundamentals Unplugged Lessons | Code.org

<https://code.org/curriculum/unplugged>

Computational Thinking (HelloRuby)

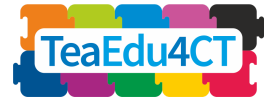
<https://youtu.be/K3vwRQCfTHc>

Tangrams

[https://www.youtube.com/watch?v=gW\\_aPXjgBTc](https://www.youtube.com/watch?v=gW_aPXjgBTc)

My Robotic Friends

<https://www.youtube.com/watch?v=xaW3PAzHxCU>



### Coding

<https://teachoutsidethebox.com/2016/12/coding-little-kids>

### Patterns

<https://www.youtube.com/watch?v=C3c8fzbsfOE>

<https://www.youtube.com/watch?v=71hqRT9U0wg>

<https://www.youtube.com/watch?v=WX8HmogNyCY>

Otterborn, A., Schönborn, K. J. & Hultén, M. (2020). Investigating Preschool Educators' Implementation of Computer Programming in Their Teaching Practice. *Early Childhood Education Journal*, 48, 253-262.

<https://link.springer.com/content/pdf/10.1007/s10643-019-00976-y.pdf>

### Storigami

<https://www.youtube.com/watch?v=Wz7BUARb9rw>

### Algorithm

<https://blogs.microsoft.com/on-the-issues/2016/11/17/teaching-kids-computer-science-no-computer-required/>

### Songs

<https://youtu.be/CG8F-6dZk8k>

<https://www.youtube.com/watch?v=BwHMMZQGFoM>

### Data transmission video

<https://www.youtube.com/watch?v=cBZUckBCy-U>

### Sample toys

<https://www.primotoys.com/>

### Programing

<https://teachoutsidethebox.com/2016/12/coding-little-kids/>

### Coding Games

<https://www.tynker.com/>

<https://childhood101.com/coding-for-kids/>

<https://teachyourkidscode.com/coding-for-preschoolers/>

### Worksheet

<https://tr.pinterest.com/pin/387098530467075022/>

### Videos

<https://www.youtube.com/watch?v=oxhYaiSnIAo>

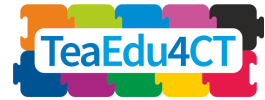
<https://youtu.be/cJQ5XzzzGj4>

### Song

[https://www.youtube.com/watch?v=gPq7wzGEjqE&feature=emb\\_title](https://www.youtube.com/watch?v=gPq7wzGEjqE&feature=emb_title)

### Video

<https://www.youtube.com/watch?v=S-Dl3rkDeyE>



### Books

<https://www.amazon.com/Bug-Detective-Maggie-Li/dp/1454915161>

<https://www.amazon.com/Leaf-Can-Millbrook-Picture-Books/dp/0761362037>

### Songs

<https://www.songsforteaching.com/tickletunetyphoon/goingonabearhunt.htm>

<https://campsongs.wordpress.com/2012/05/03/baby-shark>

<https://www.songsforteaching.com/hughhanley/imanut.htm>

### Activity

<https://www.needpix.com/photo/828426/food-chocolate-smore-campfire-delicious-snack-roasted-crackers-marshmallow>

### Song

[https://www.youtube.com/watch?v=gPq7wzGEjqE&feature=emb\\_title](https://www.youtube.com/watch?v=gPq7wzGEjqE&feature=emb_title)

### Readings

Fjørtoft, I. (2001). The natural environment as a playground for children. *Early Childhood Education Journal*, 29(2), 111-117.

<http://www.imaginationplayground.com/images/content/3/0/3002/The-Natural-Environment-As-A-Playground-For-Children-The-Impac.pdf>

Cincera, J., Valesova, B., Krepelkova, S., Simonova, P., & Kroufek, R. (2019). Place-based education from three perspectives. *Environmental Education Research*, 25(10), 1510-1523.

<https://www.tandfonline.com/doi/epub/10.1080/13504622.2019.1651826?needAccess=true>

Çabuk, B., Baş, T. & Teke, N. (2017). Are Illustrations and Texts in Picture Storybooks Innocent? - Natural Environment Messages Transmitted. Mafalda Carmo (Ed.) *Education and New Developments*. p. 333-337. InScience Press, Lisbon, Portugal.

[http://insciencepress.org/wp-content/uploads/2017/11/Education-and-New-Developments\\_2017.pdf](http://insciencepress.org/wp-content/uploads/2017/11/Education-and-New-Developments_2017.pdf)

### Music

[https://www.youtube.com/watch?v=dChJLDPodQ4&feature=emb\\_title](https://www.youtube.com/watch?v=dChJLDPodQ4&feature=emb_title)

[https://www.youtube.com/watch?v=YzRqV\\_H0ESk&feature=emb\\_title](https://www.youtube.com/watch?v=YzRqV_H0ESk&feature=emb_title)

### Breathing activities

<https://youtu.be/zRRCfmCcKI0>

### Videos

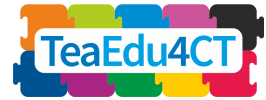
[https://www.youtube.com/watch?v=Te0Td0QVoj0&feature=emb\\_title](https://www.youtube.com/watch?v=Te0Td0QVoj0&feature=emb_title)

[https://www.youtube.com/watch?v=FiLPIEp4\\_tk&feature=emb\\_title](https://www.youtube.com/watch?v=FiLPIEp4_tk&feature=emb_title)

### Activity

<https://innerchildfun.com/2013/08/simple-summer-scrapbooks-kids-can-make.html>

### Picture



<https://search.creativecommons.org/photos/90de7bf3-6e75-40b8-b0b5-92020a2fc81a>

#### Video

[https://youtu.be/\\_rr6vzBhhOg](https://youtu.be/_rr6vzBhhOg)

#### Additional Readings

Zapata-Ros, M. (2019). Computational Thinking Unplugged. *Education in the Knowledge Society*, 20, 1-29.

<https://pdfs.semanticscholar.org/8ea2/7254a97161a9c75acbc26a1350cefdd5637c.pdf>

Sullivan, A. A., Bers, M. U., & Mihm, C. (2017). Imagining, playing, and coding with KIBO: using robotics to foster computational thinking in young children. *Siu-cheung KONG The Education University of Hong Kong, Hong Kong*, 110.

<https://www.eduhk.hk/cte2017/doc/CTE2017%20Proceedings.pdf#page=121>

Bower, M., Wood, L. N., Lai, J. W., Howe, C., Lister, R., Mason, R., & Veal, J. (2017). Improving the computational thinking pedagogical capabilities of school teachers. *Australian Journal of Teacher Education*, 42(3), 53-72.

<https://ro.ecu.edu.au/cgi/viewcontent.cgi?referer=https://scholar.google.com.tr/&httpsredir=1&article=3424&context=ajte>